The Perceptual R-Metathesis in Middle English

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Kang, Eunsoo. 2013. The Perceptual R-Metathesis in Middle English. *SNU Working Papers in English Linguistics and Language 11, 20-48.* This study aims to investigate whether the r-metathesis in Middle English is a sporadic sound change or not. The traditional view on the metathesis in English strongly argued that it is sporadic and it can be explained by vowel epenthesis and deletion. However, the result from the analysis of the Middle English variants suggests that words in a certain kind of phonological environments such as *Vrst* and *Vrht* have a significantly greater number of metathetic variants. This can be attributed to the perceptual optimization argued by Blevins and Garrett (2005). In other words, perceptual difficulty between /r/, /s/, and /h/ followed by /t/ in coda position might be the cause of the r-metathesis, which provides more plausible explanation than the vowel epenthesis and deletion. **(Seoul National University)**

1. Introduction and Previous Researches

Many previous phonological theories have generally regarded *metathesis* as an irregular and sporadic sound change. Metathesis, which refers to change in sequence of sounds, has not been properly come to the forefront of linguists. This is because it is not only hard to figure out the phonological environments which trigger this phenomenon, but also difficult to explain why this change happens in order to achieve what kind of linguistic or communicative goal. Therefore, it is no wonder that many linguists ascribed this phenomenon simply to performance error. However, many recent studies are challenging this "metathesis myth" (Hume, 2001) and have attempt to present a theory which can explain how metathesis occurs and what causes it. This paper, therefore, will examine the problem of

traditional view of the metathesis in Middle English and provide an alternative explanation for this phenomenon.

1.1 Studies and Theories on Metathesis

For more than one hundred years, many theories have generally considered metathesis as an irregular phenomenon or failed to provide a sufficient explanation on its cause. It was not until recent years that linguists began to take this phenomenon into account within a field of linguistic research.

The traditional view on metathesis, which lasted more than half of the hundred years, has a general disregard for metathesis. This started with so-called *Neo-grammarian's Manifesto*, which strongly argued for the regularity in sound change. In this manifesto, Osthoff and Brugmann branded metathesis as "incomprehensible" because they "[have] taken place only in isolated forms and … [have] not affected all other forms of the same kind" (Osthoff and Brugmann, trans. 1967). To put it another way, they regarded metathesis as being outside the range of linguistic research because they could not observe any consistent rule in examples of metathesis. What they thought a *regular* sound change was a kind of mechanical or analogical change in sounds, which demonstrates a certain coherent rule without no exceptions. Scientifically correct as their argument seems, they just got rid of many difficulties in explanation by simply ruling them out as exceptional.

Many later researchers have tried to explain metathesis, but they also shared similar views on metathesis with Osthoff and Brugmann. Grammont (1950) and Ultan (1978) did try to provide a phonological explanation in terms of *well-formedness* in syllable structure. They thought that a certain problem in terms of articulation or phonology might had resulted in change in the sequence, which naturally lead to metathesis. However, they all agreed that metathesis in general is irregular and only a part of its examples can be subject to the linguistic

research. For them, metathesis was a last resort to attain a preferred or favored syllable structure for satisfying ease of articulation or phonotactic rules. Hock (1985) also underestimated metathesis as having "notorious irregularity." He argued that some examples showing regularity do exist in metathesis but, they can be only regular "if [they serve] a specific structure purpose" (Hock, 1985, 1991). What he tried to do with metathesis, therefore, was the same as Grammont and Ultan; he only applied metathesis as a last expedient for several phenomena which are difficult to explain. Metathesis itself still remained exceptional.

By the rise of *generative phonology*, a new approach to metathesis appeared. Chomsky and Halle (1968) recognized metathesis as a "perfectly common phonological process," and put it into a field of linguistic research. They viewed metathesis as a change in linearity of phonemic sequence, and described the metathesis /sk/ to [ks] in English as exchange in sequence from 1 and 2 to 2 and 1 (the second phoneme later precedes the first phoneme). In this way, they formularized metathesis within the bounds of phonology. This formularization deserves to be acknowledged because many linguists prior to them just regarded metathesis as irregular and thus, unworthy of linguistic explanation. But they could not present a convincing explanation on what causes this change in linearity, and why a certain order in phonemes is required.

To the second question, *optimality theory* has attempt to give a plausible answer. McCarthy (1995) and Flemming (1996) proposed a new constraint *linearity* in describing metathesis. The linearity constraint, according to them, requires a certain linear order to match between input (underlying) and output. Metathesis occurs when other constraints dominates this linearity. They proposed various *well-formedness* constraints which can override the constraint linearity. A hierarchy of these constraints, therefore, decides which kind of metathetic form shows up. Hume (1997) further summarized this

discussion on metathesis as the "violation of linearity" by language specific constraint ranking. In this respect, optimality theory did succeed to give a partial explanation on metathesis, especially why a certain sequence of phonemes is needed. They argued that language specific well-formedness requires the violation of linearity and this finally leads to metathesis, the change in sequence. Yet, the cause of metathesis still remained unanswered because it does not address the question of what well-formedness consists of in describing metathesis.

The breakthrough in research of metathesis came from Blevins and Garrett's study (1998). After investigating the metathetic phenomena of several languages, they suggested acoustic or perceptual features which have such a long duration that they are prone to spread into the sounds around them. They took up these features as a starting point of describing metathesis. For example, they pointed out that rhotacity can be spread because its lowered F3 usually has long duration. Aspiration such as those observed in /s/ and /h/ is also easy to extend over because the characteristics of aspiration, more energy in F0 and more noise, tend to affect the sounds around. These features can be "re-interpreted" as existing in underlying forms as they can easily extend to sounds around as if they originated from there. Metathesis, then, finally occurs to satisfy *perceptual optimization*. This optimization is actually a change from something harder to hear to something easy to hear by arranging or reinterpreting a certain movable feature. Recently, they further divided the cause of metathesis into four categories (Blevins & Garrett, 2005): *perceptual, compensatory, coarticulatory, and auditory*. What they argue, however, remains intact; metathesis is one of linguistic and regular phenomena which occurs to serve a function of perceptual optimization.

To sum up, the perceptual explanation on metathesis only can give an answer to why metathesis occurs and what kind of sequence appears as a result of the metathesis. The tradition view on metathesis, which generally disregarded it as a sporadic phenomenon just ruled out many

linguistic phenomena such as metathesis as irregular. Generative grammar did succeed to formulate metathesis, but they also failed to explain it. Optimality theory gives a partial explanation on why a certain sequence is required in metathetic change. Only the perceptual approach can give a plausible answer on what causes metathesis, and in what sequence it results. Therefore, this study will proceed to examine metathesis by applying the perceptual optimization suggested by Blevins and Garrett (2005).

1.2 Studies on the Metathesis in Middle English

On the contrary to the recent theoretical trend, the studies on the metathesis in English firmly have held the traditional view; metathesis is sporadic and only the small number of examples can be subject to the linguistic research.

The traditional view on metathesis can be confirmed by Lehman (1962) and Hogg (1976) in describing historical phonology in English. Lehman defined metathesis as a sporadic sound change and ascribed this solely to the dialectal variation. He pointed out late West Saxon dialect as a source of metathesis as it showed remarkably many metathetic forms. As metathesis only affects a few words which he regarded as scribal variants, he reconfirmed the traditional view that metathesis is sporadic and irregular. On the other hand, Hogg took a rule-based approach to analyze r-metathesis in English. He noticed that breaking, which was frequent in Old English, did not occur before the metathesized /r/. Based on this observation, he thought that the forms which suffered r-metathesis are not the underlying form. If r-metathetic forms were underlying ones, they would naturally be the input of breaking phonological change, and result in breaking just like other forms which show no metathesis. Furthermore, he concluded that metathesis does not come from phonological rule, but only from phonetic misperceptions or errors.

Even though there have been different approaches, they usually ended up with a simple description on metathesis in English. A notable study of these is one by Alexander (1985). He investigated various misspellings which show both forms which underwent metathesis and forms which do not show metathesis. After examining these spelling variants, he concluded that vowel epenthesis and stress shift around the coronal consonants resulted in metathesis. For example, *through* in Present-day English comes from *thuruh*, which shows vowel epenthesis of Old English *thurh*. He argued that vowel epenthesis and succeeding stress shift might trigger vowel deletion. However, what he insisted can only be a description of metathesis. He cannot give a plausible reason why a certain vowel had to be inserted why the stress had to shift into another place in these words, and why the original vowel had to suffer deletion, at the first place. He just fit the pre-existing phonological rules into the metathetic phenomenon and asserted that he proved it.

The view on metathesis as a sporadic change and mere description on it has continued until a recent date. Welna (2002) examined how r-metathesis spread in Middle English, but she also failed to give a phonological explanation on it. After checking the scribal variants, he categorized the metathetic forms in Middle English as sporadic one and permanent one. In judging whether it is sporadic or permanent, what he based on was what kind of form survives in Present-day English. If the metathetic form survives in Present-day English, the form was called permanent. On the other hand, a certain form was tagged as sporadic because the metathetic form no longer appears in Present-day English. Based on his research, he concluded that metathesis in Middle English came from lexical diffusion from various dialectal forms, especially from northern dialects. He came to such a conclusion because not all possible words are subject to metathesis, and sporadic ones are much more frequent than permanent ones. What he missed, however, was that he hastily concluded that synchronic phenomenon, i.e. metathesis, was sporadic because diachronic change shows sporadic results. In other

words, he regarded synchronic metathetic variations as sporadic because their modern remnants are few and show no consistency. In fact, a change which seems irregular or sporadic from a diachronic view might be regular in terms of a synchronic variation, such as the ablaut of the strong verbs of Old English.

Still, the recent studies on the metathesis in English take old-fashioned approaches in spite of many defects in explanation. Wójcik (2012) explained the r-metathesis in terms of syllable structure. After he summarized the previous studies on metathesis, he asserted that both types of metathesis (either progressive or regressive) have existed, and therefore, metathesis comes from weakening of nuclei in English. He argued that this kind of weakening has been one of the important traits in English, such as final vowel deletion, i.e. *apocope*. He further insisted that weakening of nuclei and loss of final vowel might demand to reanalyze or reconstruct the syllable structure. This change, he though, resulted in metathesis. The problems of his explanation are the same as the ones by Osthoff and Brugmann (trans. 1967), Grammont (1950) and Ultan (1978). The structural change might trigger metathesis, but it will remain problematic and questionable why only certain forms suffered metathesis.

As a summary, the studies on metathesis in English have generally followed the traditional approach, which regarded it as sporadic and exceptional. Many studies, therefore, came to address other than linguistic factors as a cause of metathesis. Dialectal variation and lexical diffusion were their chief suspects. Some studies even confused synchronic variation with diachronic change, and used it to reconfirm the traditional view. Even the very recent study on metathesis takes an old-fashioned approach which highly emphasizes the change in syllable structure. Therefore, this paper will examine the synchronic metathetic phenomenon in Middle English, using the concept of perceptual optimization, which has recently drawn much attention. In addressing the problem of metathesis, this can give a plausible explanation on why

metathesis occurred.

2. Study Question and Hypothesis

As reviewed above, the metathesis in English has received relatively little attention from the perceptual optimization. The traditional view of metathesis as a sporadic and irregular sound change has stayed intact in the case of English. Many sociolinguistic factors such as dialects and language diffusion were suggested as possible factors. Therefore, there remains a large piece of uncharted field of phonological research in the metathesis in English.

   To provide a framework for our analysis, I will propose the study question related to this phenomenon and formularize the hypothesis based on this question. The main study question of this study is: Was the r-metathesis in Middle English sporadic? In examining whether this phenomenon is sporadic or not, this study takes the recent approach to metathesis, which uses perceptual optimization. The study question, therefore, can be paraphrased as: Can perceptual optimization explain r-metathesis?

   In accordance with the study question, the hypothesis of this study will be: the r-metathesis in Middle English is not sporadic and perceptual optimization is its cause. If the r-metathesis in Middle English is genuinely sporadic, as the traditional views and many researchers argued, no common phonological environments, shared among the words, will be observed. That is to say, no phonological environment shows higher frequency of metathetic forms. On the other hand, if the r-metathesis in Middle English is not sporadic, a certain kind of phonological environment shows a higher level of occurrence of the forms which suffered the r-metathesis. Furthermore, this kind of observed environment will show lower level of perceptual clarity as the research about perceptual metathesis has argued. In other words, the

constituents of the observed metathetic environments share a similar acoustic characteristic or have a confusing acoustic trait.

In order to verify the study question and hypothesis, this paper will first show how the subject words of this study were collected and analyzed. After elaborating the methodological processes, the result of analysis and its discussion will be followed.

3. Method

In this section, this paper presents two methodologically important components of this study: what kinds of words were chosen, and how their scribal variants were collected and analyzed. Only the words which have sufficient phonological environments were subject to the investigation, and their various features such as origin, phonological environment in nucleus, or coda were closely checked in order to verify the hypothesis of this study.

3.1 Materials

In order to verify the hypothesis, a vast number of variants of the Middle English words have to be collected and investigated. To narrow down the number of subjects, this study received help from the previous studies.

Some of the previous researchers did mention about some possible elements which frequently appear around the metathesis /r/ sound (see Alexander, 1985). They reported the r-metathesis usually occurs around the coronal consonants. However, as the researcher made it clear, these researchers argued for irregularity or sporadic nature of metathesis. They insisted that there is no reason to believe the metathetic forms do exist as underlying forms. Based on this, they concluded the metathesis is simply an error in articulation.

The Middle English words, therefore, which have both /r/ and a coronal consonant in either their lexical or variant forms are subject to the investigation. The hypothesis of this study assumed that metathetic words share the existence of a certain kind of common phonological environments. If the hypothesis is incorrect, the collected words which show metathesis have no shared traits. On the other hand, the common environments can be observed if the hypothesis is correct.

In defining the words subject to this study, however, I will clarify two important phonological features, which might compromise the analysis: morpheme boundary, and length of the words.

First of all, this study does not include derived words, which contain morpheme boundary within themselves. Phonological rule might be differently applied before and after or even across morpheme boundary. Furthermore, morpheme boundary itself can have a certain effect on phonological phenomenon. For example, the nasal assimilation of place of articulation is not always applied across morpheme boundary (English [ˈɪŋglɪʃ] but incoming [ˈɪnˌkʌmɪŋ]). Derived words, by definition, always have at least one morpheme boundary. Therefore, including derived words in this study might result in dubious conclusion because metathesis phenomenon might interact with morpheme boundary or the morpheme boundary itself could affect metathesis. The simplest solution to this problem is to get rid of all the possible effects of morpheme boundary. Therefore, this study will be excluding all the derived words.

The other factor which might affect the result is the length of words. The number of syllable in a word, word length, can also be one of the crucial features which might have impact on phonological phenomenon. A certain sound change only applies to words with a certain length or a certain number of syllables. The classic example of word length effect is *trisyllabic shortening* in English. Only the words having more than three syllables underwent this phenomenon, and even the stressed syllable was shortened if it was sufficiently subject to this type of

shortening. In order to control the effect from word length, therefore, the words subject to the investigation must have the same or limited number of syllable, and this study will choose only the words which have just one syllable in its root as a subject of the study.

In short, this study will investigate underived words with one syllabic root, containing /r/ and coronal consonants. The researcher in this study did not exclude various inflected forms such as verbs with infinitival ending –*ian*. This is because what this study tries to avoid is the intervening effect with morpheme boundary, and these inflectional endings are not the part of the root. Apocopic vowel, usually transcribed as 'e' in the word-final position, also is not considered as a part of the root. It is because this kind of vowel also neither has any morpheme boundary, nor consists of the root. Only the words satisfying all these requirements are subjects of this study.

3.2 Process

In finding out the words subject to this study, the researcher used electronic material and utilized *regular expression* searching method.

The electronic material used in this study is the online Middle English dictionary provided by University of Michigan[1]. This online lexicon provides great amounts of variant forms which were all collected from the Middle English texts. It even shows more scribal variants than the Oxford English Dictionary, and gives enormous data on Middle English, including words' etymology and usage. Therefore, it is helpful in judging whether the metathesis happened or not only during the Middle English period.

For efficiency reasons, the regular expression method was applied to

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[1]The electronic Middle English Dictionary is a lexicon and database for the English used for the period from 1000 to 1500. This is free and available to all: http://quod.lib.umich.edu/m/med.

look up the target words. The regular expression is a sequence of coded characters and commands in computing; it is very convenient when the same or similar but recursive procedures are needed. This study utilized the regular expression to find the words which were defined as the target in the material section above. For example, the string such as ^b[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$ gives a list of words which start with *b*, has more than one vowel character in the next position, followed by the character *r*, with or without more than one consonant character(s) before the character *t* in the word-final position. Apocopic vowel /e/ and verbal inflectional endings such as *–en* and *–an* are ignored in the word-final position (for the regular expressions used in this study, see Appendix 1). Using the various regular expressions like this, the researcher collected lists of words which were seemingly appropriate for the investigation.

   At last, the researcher manually checked each word from the lists and analyzed words' various lexical and phonological information. As the lists provided by the regular expression method cannot automatically differentiate whether each word is derived or not, the researcher manually checked its etymology and excluded all the derived words. After ruling out a significant number of derived words, the researcher imported all the information about the listed words into a database: for instance, words' origin, forms in the source, forms or variants in Middle English, meaning, part of speech, and whether metathesis occurs or not. Using this database, this study investigated whether there exists a certain kind of phonological environment which shows high frequency of metathesis.

4. Results

The data attained from the words subject to this study show two distinct results. On the whole, very small portion of words shows r-metathesis

(12.9%). However, there exists a certain type of phonological environments which exhibits very high frequency of r-metathesis (69.2%).

In general, the proportion of words with metathesis to words without this phenomenon is quite low. Among 210 words, only 27 words show any kinds of r-metathetic form. This proportion, of course, is relatively higher than those in the whole Middle English vocabulary because almost one out of ten underwent r-metathesis. Still, this ratio is not enough to say the r-metathesis in Middle English is not sporadic but a regular sound change. As many researchers supporting the traditional view of metathesis have argued, the portion which the metathesis accounts for is far smaller than the rest of the words with no variants of metathesis. On the surface, therefore, it seems reasonable that the r-metathesis observed in these words is merely an exceptional or peculiar case.

However, a certain kind of phonological environments shows the distinctively great number of frequency in occurrence of metathetic forms. The r-metathesis mostly occurs in front of –st or –ht in coda position. Under these environments, 21 out of 57 words show metathetic variants, which amounts to 36.8 percent. As for the words ended with –st, 16 out of 43 words exhibit r-metathesis (37.2%), and 5 out of 14 words with –ht in word-final position do present metathetic forms, which reaches 35.7 percent. These results are presented in the table 1 below:

Table 1
Numbers of Words Showing Metathesis and Words Presenting no Metathetic variants, based on their phonological sequences in coda position (or word-final)

	M	No M	Sum
-st or -ht	21 (36.8%)	36 (63.2%)	57 (100%)

-st	16 (37.2%)	27 (62.8%)	43 (100%)
-ht	5 (35.7%)	9 (64.3%)	14 (100%)
Overall	27 (12.9%)	183 (87.1%)	210 (100%)

Note. M = The number of words showing metathesis; No M = The number of words presenting no metathetic variants; *–st or –ht* = The words which have the phonological sequence of either /s/ and /t/ or /h/ and /t/ in their coda position (or word-final); *-st* = The words which have the phonological sequence of /s/ and /t/ in their coda position (or word-final); *-ht* = The words which have the phonological sequence of /h/ and /t/ in their coda position (or word-final)

As you can see in the table 1 above, the words with either *–s* or *–ht* in their coda position present higher proportion of metathetic forms, compared to that of overall.

Of special important, the particular sequences such as *Vrst* and *Vrht* show much greater occurrence of metathetic forms than the *rVst* and *rVht* sequences[2]. The words having either *rVst* or *rVht* sequence generally remain intact, of which 28 out of 31 words keep their original position (90.3%). On the other hand, the words with the *Vrst* and *Vrht* sequence generally show more variants; r-metathesis can be observed in 18 out of 26 words (69.2%). The table 2 below presents this result:

Table 2
Numbers of Words Showing Metathesis and Words Presenting no Metathetic variants, based on the structure of rhyme

	M	No M	Sum
rVst and rVht	3 (9.7%)	28 (90.3%)	31 (100%)
rVst	3 (13.0%)	20 (87.0%)	23 (100%)
rVht	0 (0%)	8 (100%)	8 (100%)

[2]*V* represents any kinds of vowel, while *r, s, h*, and *t* each represents each phonemes corresponded to each sound (i.e. /r/, /s/, /h/, and /t/).

Vrst and Vrht	18 (69.2%)	8 (30.8%)	26 (100%)
Vrst	13 (65.0%)	7 (35.0%)	20 (100%)
Vrht	5 (83.3%)	1 (16.7%)	6 (100%)
Overall	27 (12.9%)	183 (87.1%)	210 (100%)

Note. M = The number of words showing metathesis; No M = The number of words presenting no metathetic variants; *rVst and rVht* = The words which have the phonological sequence of either /r/, any vowel, /s/, and /t/, or /r/, any vowel, /h/ and /t/; *rVst* = The words which have the phonological sequence of /r/, any vowel, /s/, and /t/; *rVht* = The words which have the phonological sequence of /r/, any vowel, /h/ and /t/; *Vrst and Vrht* = The words which have the phonological sequence of either any vowel, /r/, /s/, and /t/, or any vowel, /r/, /h/ and /t/; *Vrst* = The words which have the phonological sequence of any vowel, /r/, /s/, and /t/; *Vrht* = The words which have the phonological sequence of any vowel, /r/, /h/ and /t/

As shown in the table 2, the words in which /r/ precede a vowel show smaller number of instances of metathesis (only 9.7%). On the other hand, the words which have /r/, /h/ and /t/ all in their coda (or word-final) position reveal much higher instances of metathesis (69.2%).

Notably, many of the words which exhibit metathetic variants do not have such variants in the Old English periods. Many previous studies on the metathesis in English insisted that this phenomenon originated from Old English, especially late West-Saxon dialect. In a sharp contrast to this traditional view, many of the r-metathesis variants are confirmed to newly emerge in the Middle English period. The table 3 suggests the proportional difference between the metathetic variants which already existed in the Old English period and the metathetic forms newly emerging in Middle English:

Table 3
Numbers of Words Showing Metathesis in Old English and Words Starting to Exhibit Metathesis in Middle English

	OE	ME	Sum

	OE	ME	Sum
-st or-ht	3 (14.3%)	18 (85.7%)	21 (100%)
-st	2 (12.5%) (frost/forst, wrist/wyrst)	14 (87.5%)	16 (100%)
-ht	1 (20.0%) (wyhta/wrihta)	4 (80.0%)	5 (100%)
Overall	3 (11.1%)	24 (88.9%)	27 (100%)

Note. OE = The number of words already showing metathesis in the Old English period; ME = The number of words which start to exhibit metathesis in the Middle English period;; *–st or –ht* = The words which have the phonological sequence of either /s/ and /t/ or /h/ and /t/ in their coda position (or word-final); *-st* = The words which have the phonological sequence of /s/ and /t/ in their coda position (or word-final); *-ht* = The words which have the phonological sequence of /h/ and /t/ in their coda position (or word-final); Overall: the words which show metathesis.

As for words subject to this study, only a handful of words (just three instances), which show metathesis in writing in the Middle English period did already begin to exhibit such metathetic forms in the Old English period. Most words with metathetic variants are genuinely innovative forms in the Middle English period. In other words, the metathesis in these words can hardly be explained as a remnant of Old English as the traditional view insisted.

Last but not least, very similar phonological environments *–t* (without either /s/ or /h/) show relatively lower level of frequency in metathesis. Only 6 words out of 106 instances have metathetic variants, which accounts for only 5.7 percents. The table 4 draws a comparison of the rate of occurrence between in the *-st, -ht*, and *-t* sequences:

Table 4
Numbers of Words Showing Metathesis, by Each Type of Sequences

	M	No M	Sum

-t	6 (5.7%)	100 (94.3%)	106 (100%)
-st	16 (37.2%)	27 (62.8%)	43 (100%)
-ht	5 (35.7%)	9 (64.3%)	14 (100%)
Overall	27 (12.9%)	183 (87.1%)	210 (100%)

Note. M = The number of words showing metathesis; No M = The number of words presenting no metathetic variants; *-t* = The words which have /t/ but neither /s/ nor /h/ in their coda position (or word-final); *-st* = The words which have the phonological sequence of /s/ and /t/ in their coda position (or word-final); *-ht* = The words which have the phonological sequence of /h/ and /t/ in their coda position (or word-final)

As you might observe in this table, the words containing /r/ and with /t/ in their coda position present a strikingly less number of metathetic variants, compared with those in similar phonological environments such as *–st* and *–ht*.

In summary, the data reveals that a certain kind of phonological environments, which contain either /s/ or /h/ in coda position, just before the /t/ sound, shows greater number of metathetic instances. Particularly, the sequences of which a vowel precedes /r/ such as *Vrst* and *Vrht* have the greatest number of variants showing r-metathesis.

5. Discussion

As the results suggested above indicate, the hypothesis of this study turns out correct. The hypothesis presumed the existence of phonological environments which show more instances of metathesis. The results presented above show that many of the words containing /r/ and either /s/ or /h/ in their coda position have metathetic variants. These results accord fully with the prediction offered by the hypothesis. Accordingly, it can be concluded that the hypothesis is correct, and metathesis in Middle English is not sporadic.

The possible cause of the r-metathesis, then, can be traced to the

phonetic traits of /r/, /s/, and /h/. Three important facts of the results support this analysis. At first, the words with the sequences which the vowel precedes /r/, such as *Vrht*, or *Vrst* show relatively a greater number of instances with metathesis (69.2%). On the contrary, the words with the *rVht* or *rVst* sequences, which /r/ precedes the vowel show relatively lower frequency of metathetic variants (9.7%). Lastly, very similar environments such as *Vrt* and *rVt* exhibit extremely few instances of metathesis (5.7%). To sum up, only the sequences in which /r/ shares the coda position with /h/ or /s/ before a coronal consonant /t/ provide a significantly greater number of metathetic variations, while /r/ and /t/ in the same coda position do not seem to contribute in metathesis phenomenon. Therefore, the interactions between /r/ and /h/, and /r/ and /s/ might be suggested as the probable cause of the r-metathesis.

This analysis of metathesis accords well with the perceptual metathesis suggested by Blevins and Garrett (2005). According to their arguments, rhotacity and aspiration are one of the several phonetic traits which easily diffuse into the phonemes around. Lowered third formant (F3), as noted earlier in the previous research section, does feature in articulating the /r/ sound. A characteristic strong noise is a notably diffusible feature of the /h/ and /s/ sounds. All these phonetic features of /r/, /h/, and /s/ can spread into other sounds around them. It is, therefore, perceptually prone to confuse these consonants with others when these sounds stick together; for their prominent features can diffuse throughout, which makes it difficult to distinguish them.

The last /t/ sound in these sequences, moreover, can intensify the perceptual difficulty. At first, this /t/ sound can reduce and limit the duration of other preceding sounds. As English is a stress-based language, pronouncing the complex coda clusters takes not significantly much different time from articulating a single consonant coda [3].

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[3] Actually, many historically long vowels tend to shorten before the following complex

Therefore, speakers have to quicken the articulation /r/ with /h/ or /s/ preceding the last /t/ sound[4], which would create more confusion. Secondly, /r/, /s/, and /t/ all have the same place of articulation; broadly speaking, they are all coronal consonants. Consequently, it is hard to distinguish the correct sequence of these sounds, in terms of place of articulation and manner of articulation; for /r/, /s/, and /t/ share the same place of articulation, and /r/, /s/, and /h/ tend to extend their manner of articulation into adjacent sounds.

As a result, the r-metathesis, especially moving from coda position into onset can be regarded as a natural phonological phenomenon for these two reasons; first of all, lowering F3 of the /r/ sound following the vowel can also be caused by the /r/ sound preceding the vowel. Namely, whether /r/ sound precedes or follows the vowel does not significantly matter with regards to its characteristic lowered F3. Secondly, this r-metathesis can relieve the perceptual difficulty triggered by /r/, /h/, and /s/ sharing the coda position with following /t/. In this regard, the r-metathesis can be called as perceptual optimization, which signifies a change from a sequence hard to perceive into one relatively easy to differentiate.

There is supporting evidence; phonological environments similar to the one in this study show metathetic variants. The most notable examples are OE *þurh* (ME *thurgh*, *through* > Present-day English *through*) and OE *þerscan* (ME *threshen*, *thersche* > Present-day English *thresh*). These examples all started to exhibit metathetic variants in the Middle English period. Even though these are not exactly in the same environment described in this study, such as /r/ with

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coda clusters. Consider Pre-cluster Shortening in late Old English, such as OE *gāst* > Present-day English *ghost*.

[4]The plosive or stop sounds have a sudden burst of air-stream in a relatively short duration as one of their characteristics. Therefore, perception of stop sounds and their place of articulation largely depends upon their impact on adjacent vowels. (See Johnson, 2012)

/s/ or /h/ followed by the last /t/, it is the same that the sound /r/ and /s/ or /h/ shared the coda position. The existence of metathesis in this environment, therefore, accords with the r-metathesis previously discussed as a method for fulfilling perceptual optimization. To put it differently, these examples can be another supporting instance in which acoustic confusion of /r/ and an aspirated sound in coda position caused the r-metathesis.

Several possible counterexamples such as *burst*, *first*, and *thirst* in Present-day English, are actually refutable and simply explained by *frequency effects* in later times. Many linguistics supporting the traditional view of metathesis have suggested these words as an obvious example which demonstrates metathesis is sporadic. However, these words all have at least one metathetic variant in the Middle English period such as *brest*, *frust/frost/frest*, *thristen/thrust*. When the forms like the ones used now were fixated, therefore, is after the Middle English period. Therefore, they cannot be a genuine counterexample to the analysis of this study, which only deals with synchronic variation in Middle English. In fact, these words retain the original position of /r/ sound as in Old English; see *berstan*, *fyr(e)st*, and *þurst*. Considering these words are frequently used everyday words, *frequency effects* might hinder the metathesis. Put otherwise, in spite of perceptual difficulty in the /r/ and /s/ sequence in coda position, people have many chances to hear these words and master their phonological sequence because they are used very frequently. Summing up, the counterexamples of the traditional view actually are not relevant to Middle English, and they can be attributed to frequency effects of everyday words.

What stands out most from this perceptual approach to metathesis is it can give more comprehensive explanation than the previous and tradition vowel epenthetic theory. The vowel epenthetic theory applied by many previous researchers merely fit the phenomenon into the framework of traditional phonological theory. Therefore, it cannot

provide three important questions regarding the course of metathesis. First, it has to explain why a certain vowel is inserted in a specific place. Second, it must give an answer to why the lexical stress has to move into the epenthetic vowel. Third, it has to resolve the problem such as why the original vowel of the word has to be deleted. The perceptual approach to metathesis, however, has at least three kinds of advantage in describing metathesis in English. At first, it does not need to assume unnecessary and unreasonable vowel insertion and deletion. Next, it can explain what causes metathetic variants. At last, it can predicts which kinds of phonological environments show the higher number of occurrence of metathetic forms. Consequently, the perceptual analysis has more explanatory power in explaining the r-metathesis in English.

6. Conclusion

In the course of the discussion, this study has looked into the r-metathesis in Middle English. As the results shows, there exists a certain kind of phonological environments which shows higher rates of metathetic variants: *Vrst* and *Vhst*. This phenomenon, in which a certain type of phonological environments exhibits a greater number of metathesis, can be explained by the perceptual metathesis suggested by Blevins and Garrett (2005). The phonetic traits of /r/, /s/, and /h/, which are prone to extend over the sounds around them, might be the cause of the metathesis. The r-metathesis, then, results from the perceptual confusion in coda position, because /r/, /s/, and /t/ share the same place of articulation (i.e. coronal), and /r/, /s/, and /h/ have a similar manner of articulation which easily spreads into other phonemes. The sequences such as *Vrst* and *Vrht*, therefore, might be perceptually difficult to comprehend. As a result, it can be said that the r-metathesis in Middle English occurs in order to make the words perceptually clear, i.e. satisfying the perceptual optimization.

The results and analysis of this study provide a comprehensive and alternative explanation in the r-metathesis. They can provide a better account on what causes metathesis, and what results from it. The phonological environments shown in this study are, however, so limited that the further research is needed to identify the other possible phonological factors; for example, metathesis in compound or derived words, or longer words. The future research has to examine whether the perceptual optimization caused by the confusion between /r/, /h/, and /s/ in coda position, is language universal or language specific. In this respect, this study provides a useful ground to re-evaluate a certain phonological phenomenon disregarded for a long time, i.e. metathesis.

Appendix 1. The regular expressions used in this study.

^b[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^b[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sc|c)r[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sc|c)[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^dr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^d[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sf|f)r[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sf|f)[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^gr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^g[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^hr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^h[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^jr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^j[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sk|k)r[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(sk|k) [aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^lr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$

^l[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^mr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^m[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^nr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^n[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^pr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^p[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(s|st)[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^(s|st)r[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^tr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^t[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^wr[aeiouwyæ]+[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$
^w[aeiouwyæ]+r[bcdfghklmnpqrstvwxyzþð]*t(e|en|an)*$

Appendix 2. Results in words with -st (43)

Note: OE = Old English; OF = Old French; ON = Old Norse; ME = Middle English; ML = Middle Latin; N = Norse

List 1. Words with no metathetic variants (27)
From Vrst to Vrst (7)

1) OE dyrstig> ME durst
2) OE first, first > ME first, virst, ferst*(roof, ceiling)*
3) OE gærs> ME garst, gerste
4) OE hierstan> ME hirsten*(verb. to fry)*
5) OE hyrst> ME hirst(e), hurst(e), herst(e)
6) OE wirrest, wirst, wyrst> ME werst(e), warst(e), wirst(e), worst(e), verst, wurst(e), wer(r)est, wirsta, wrst*(most evil)*
7) OE wirrest, wyrrest, wyrst> ME werst(e), warst, worst(e), werist, wurst, wirest, wrst*(in the worst manner)*

From rVst to rVst (20)

1) OE brēost> ME brēst, breist, breost, brost, brust, bryest, brist, breast

2) OF creste> ME crēste, creiste, crece, criste.

3) OF crester> ME crēsten*(verb. to provide with a crest)*

4) OE Crīst> ME Crīst, Christ, Cristys

5) OE grist > ME grist, grest

6) OE grost> ME grost, grust

7) OF grosseté> ME grōstē

8) ML prestula> ME prest*(a sheet)*

9) OF prest> ME prēst, prest *(a forced loan of money)*

10) OE prēost> ME prēst ,prēst, preste, presth, priest, prist, preast, preist, pruest, preost, prust, prost, proest, præst*(a cleric)*

11) N *traist> ME traist(e), traste, treist

12) ON treystr> ME traist(e), traiist, trast(e), treist

13) OF treste> ME trest(e), trist(e), tret(e)

14) OF triste> ME trist(e), trēst(e) *(an appointed station)*

15) OF trist, triste> ME trist(e), trest*(feeling distress)*

16) ON traust> trust, truste, trost(e), troiste, trist(e), trest(e), treost*(confidence)*

17) ON traustr> trust, truste, trost, trist(e), trest(e) (trustworthy)

18) OE *trystan> ME trusten, trust(e)(n)(e), truston, truist, trost(e)(n)(e), troist, trist(e)(n), trest(e)(n), trosti, trusti*(verb. to be confident)*

19) OE wrǣst, wrāst> ME wrest, wrast(e).

20) OE wrǣstan > ME wresten, wreste, wreston, wrēst, wrast(e), wrist, wraist(e)*(verb. to turn)*

List 2. Examples showing metathesis (16)

From Vrst to rVst (11)

1) OE berstan> ME bresten, brasten, bristen, brusten; bersten, birsten, bursten, besten*(verb. to be broken)*

2) OE byrst> ME brest, berst, barst*(breaking)*

3) OE byrst> ME brist, birst, brust, burst *(misfortune)*

4) OE byrst> ME brust, byrst*(a bristle)*

5) OE gebyrst> ME brist, brust, burst

6) OE dærst> ME drast, darst, dreste

7) OE fyrst, first > ME first, furst, ferst, feorst, forst, virst, vurst, frest, vrist*(a limited period of time)*

8) OE fyrst> ME first, furst, forst, ferst, virst, vurst, vorst, verst, frist, frust, frost, frest*(first)*

9) OE fyrst> ME first, furst, forst, ferst, virst, vurst, vorst, verst, frist, frust, frost, frest*(firstly, for the first time)*

10) OE *fyrstan, *firstan> ME firsten, versten, fristen, fresten*(verb. to delay)*

11) OE gorst, gors> ME gorst, gors, grost, gost

From rVst to Vrst (3)

1) OF crouste, croste> ME cruste, crouste, croste, curst

2) OE gristan> ME girsten, graiste*(verb, to grind)*

3) OF prest, près, pries > ME prest, preist, prist, prast, pirst*(ready)*

From either Vrst or rVst (showing variants from the Old English period) (2)

1) OE frost, forst> ME frost, vrost, forst, vorst, first

2) OE wrist, -wyrst> ME wrist, wriste, wrest(e), wrost, wirste, virste

Appendix 3. Results in words with -ht (14)

Note: OE = Old English; OF = Old French; ME = Middle English; MD = Middle Dutch; N = Norse

List 1. Words with no metathetic variants (9)
From Vrht to Vrht (1)

1) OE torht> ME torhte

From rVht to rVht (8)

1) OE *dreaht, *dræht> ME draught, draucht, drau3t, drauht&draght, dract, dragt, dra3t, draht, drai3t &draugth, dra3th, drau3hthte &draufthe&draut, drauth

2) OE dryht> ME driht, dri3t

3) OE drūgoþ, -aþ> ME drŏught(e), drou3t(e), drouht(e), droght(e), dro3t(e), drohut, drught, drugte, dru3t &drougthe, drou3th(e), drouhthe, dro3the, dru3the, druhhþe&droute, drouthe, drouith, &dreth, druithe

4) MD vracht, vrecht> ME fraught, fraght, fre(i)ght, freit, frait.

5) MD vrachten, vrechten> ME raughten, fraghten, fre(i)ghten, frighten *(verb. to load)*

6) OE freht> ME freit, frete

7) OE traht, tract > ME tract(e), traht

8) OE truht> ME trŏut, troute, trought(e), trouhte, trou3t, trouth, trut(e), trught, trot(e), trowit, troite

List 2. Examples showing metathesis (5)
From Vrht to rVht (4)

1) OE beorht> ME bright, brist

2) OE fyrhto> ME fright, firht, furht, freiht, freit.

3) OE fyrhtan> ME frighten *(verb. to make afraid)*

4) OE wyrht> ME wrighte, wrihte, wruht(e)

From rVht to Vrht (0)
None

From either Vrht or rVht (showing variants from the Old English period) (1)

1) OE wyrhta, wrihta> ME wright(e), wrigt(e), wrigth(e), wrigh, wri3t(e), wri3th(e), wriht(e), writ(e), with(e), writht, wreth(e), wreght, wrouhte, whrouhte, wricht(e), wirhte, wruhte, wruchte, wurhte, wurhta, wurhtæ, wuruhte

Appendix 4. Results in words with –t (106)

Note: OE = Old English; OF = Old French; ON = Old Norse; ME = Middle English

List 1. Words with no metathetic variants (100)

brat, Brit, brŏuet, bruit, Brūt, brūt, berten*(verb)*, crōt(e), crūet, crāte, crēte, cripte, scrat(t)e, scratten*(verb)*, screte, scrīt(e), carte, cert, cōarten, cŏurt *(court)*, cŏurt*(some kind of a cart)*, scirten*(verb)*, drīten*(verb)*, droit, dart, frēt, frēten*(verb. to devour)*, frēten*(verb. to adorn)*, frēten*(verb. to bind)*, frōten*(verb)*, fruit, fert, ferten*(verb)*, fōrt*(strength)*, fōrt*(strong)*, fortēn*(verb)*, grāte,grāten*(verb)*, grēten*(verb. to grow)*, grēten*(verb. to weep)*, grinten*(verb)*, grōt*(a piece)*, grōt*(weeping)*, grōt*(a coin)*, grōten*(verb. to weep)*, grōten*(verb. to glut)*, grŏut, hert, herte, herten*(verb)*, hurten*(verb)*, mart, Mart(e), mirt(e), mort *(death)*, mort *(dead)*, morten*(verb)*, nirt, prāten*(verb)*, prat(t)e, prūt, prēte, part, parten*(verb)*, pōrt*(harbor)*, pōrt*(town)*, pōrt*(bearing)*, port(e) *(gate)*, sart, serte, sōrt*(fate)*, sōrt*(a measure of weight),* swart, swarten*(verb)*, stert, sterten*(verb)*, streit, strēt(e), strēten*(verb)*, strŏut, strŏuten*(verb)*, trait, trēt(e), trēten*(verb)*, trot *(horse gait)*, trot *(an old woman)*, trotten*(verb)*, truit(e), tart *(sharp)*, tart(e) *(a baked fish)*, tort *(wrong)*, tort(e) *(crooked)*, tŏurte, wrette, writ, wrīten, wrōt, wrōtan*(verb)*, wŏrt*(herb)*, wŏrt*(an infusion of grain)*

List 2. Examples showing metathesis (6)

1) OF bertonneau> ME bret

2) OE cræt> ME cart, cheart, kert

3) ON drit> ME drit, drite, dritte, dirt(e), dird, dert, durt

4) OE grēot> ME grēt, grete, greit, greot(e), greut, grut, groeth, grot, grit, grith, grette, greth, cret, gert, greoti, groete, grotte, grutte, grite, gritte, griet(e), crit, girt, greten, gruten, griten

5) OE grēat> ME grēt, grētte, grete, greit, great(e), greatte, greth, gert(e), geret, gretee, gretene, grat(e), grait, grut(e), griet, grit, girte, græt(e), griat(e)

6) OE wearte, weartte> wart, warte, wert(e), wertte, wherte, wort, wirte, wearte, wret(e_, wrette, wrot, wrothe

Reference

Alexander, J. D. (1985). R-Metathesis in English: A diachronic account, *Journal of English Linguistics, 18* (1), 33-40

Blevins, J., & Garrett, A. (1998). The origins of consonant-vowel metathesis. *Language, 74* (3), 508-556.

Blevins, J., & Garrett, A. (2005). The evolution of metathesis. In B. Hayes, R. M. Kirchner, & D. Steriade (Eds.), *Phonetically based phonology* (pp. 117-156). Cambridge, UK: Cambridge University Press.

Chomsky, N., & Halle, M. (1968). *The sound pattern of English*. New York, NY: Harper & Row.

Flemming, E. S. (1996). Laryngeal metathesis and vowel deletion in Cherokee. *UCLA Occasional Papers in Linguistics, 16*, 23-44.

Grammont, M. (1950). *Traité de phonétique*. Paris, France: Delagrave.

Hock, H. H. (1985). Regular metathesis. *Linguistics, 23*, 529-46.

Hock, H. H. (1991). *Principles of historical linguistics*. New York, NY: Mouton de Gruyter.

Hogg, R. M. (1977). Old English r-metathesis and generative phonology. *Journal of Linguistics, 13*(2), 165-175.

Hume, E. V. (1997). Vowel preservation in Leti. *Oceanic Linguistics, 36*, 65-101.

Johnson, K. (2012). *Acoustic and auditory phonetics*. Chichester, UK: Wiley-Blackwell.

Lehmann, W. P. (1962). *Historical linguistics*. New York, NY: Holt, Rinehart, and Winston.

McCarthy, J. (1995). *Faithfulness in Prosodic Morphology & Phonology: Rotuman Revisited*. Amherst, MA: University of Massachusetts. Retrieved June 20, 2013, from http://ruccs.rutgers.edu/roa.html

Osthoff, H., & Brugman, K. (1878). Morphologische Untersuchungen

auf dem Gebiete der indogermanischen Sprachen I [Preface to morphological investigations in the sphere of the indo-european language I] (W. P. Lehmann, Trans.). In W. P. Lehmann (Ed.), *A Reader in Nineteen Century Historical Indo-European Linguistics*. Retrieved June 20, 2013, from http://www.utexas.edu/ cola/centers/ lrc/books/read14.html

Ultan, R. (1978). A typological view of metathesis. In J. H. Greenberg (Ed.), *Universals of human language, vol. 2, Phonology* (pp. 367-402). Stanford, CA: Stanford University Press.

Welna, J. (2002). Metathetic and non-metathetic form selection in Middle English. *Studia Anglica Posnaniensia, 38*, 501-513

Wójcik, J. (2012). Metathesis in the History of English, *Annals of Arts, 60* (5), 45-63.

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